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United States Patent Application
Entitled:

~~ADJUSTABLE HOLOGRAPHIC SETUP FOR RECORDING HIGH-FIDELITY GRATINGS WITH WELL-~~CHARACTERIZED PERIODS AND ~~CHIRPS~~

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Apparatus and Method for Directing a Light Beam to a Target

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Apparatus and Method for Directing a Light Beam to a Target

~~ADJUSTABLE HOLOGRAPHIC SETUP FOR RECORDING HIGH-FIDELITY GRATINGS WITH WELL-CHARACTERIZED PERIODS AND CHIRPS~~

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to optics. More specifically, the present invention relates to an optical setup for writing high-quality interference patterns with a well characterized period and chirp.

2. Discussion of the Related Art

Many satellite and terrestrial optical communication systems require transmission of analog optical signals. Commonly, amplitude modulation of the optical carrier is used. However, this approach suffers from poor signal to noise ratio. It is well known that broadband modulation schemes that utilize higher bandwidth than that of the transmitted waveform may improve the signal to noise ratio over that using amplitude modulation. Pulse position modulation (PPM) is one such technique. In pulse position modulation, a shift in the pulse position represents a sample of the transmitted waveform. This is shown in Figure 1. It can be shown that for a given power source $SNR_{PPM} \propto SNR_{AM} (t_P / \tau)^2$ where t_p is the spacing between the unmodulated pulses and τ is the pulse duration, respectively. Pulse position modulation for optical communications requires new techniques for generating trains of optical pulses whose positions are shifted from their unmodulated positions in proportion to the amplitude of a transmitted

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Fig. 9 is a method for directing beams of light at a target utilizing the interferometers of Figs. 5 and 6;

Fig. 10 is a diagram illustrating an analyzer device used to form a reflector according to the present invention;

Fig. 11 is a diagram illustrating a plot of wavelength versus reflection for the device illustrated in Fig. 10 having a uniform grating; and

Fig. 12 is a diagram illustrating a plot of reflection versus wavelength for a chirped grating using the device of Fig. 10.

DETAILED DESCRIPTION

The following description is not to be taken in the limiting sense, but is made merely for the purpose of describing the general principals of the invention. The scope of the invention should be determined with reference to the claims.

This application incorporates by reference United States Patent Application No. 10/266,836, filed October 8, 2002, now abandoned, entitled TECHNIQUE AND METHOD FOR MANUFACTURING DISTRIBUTED FEEDBACK STRUCTURES IN Ti:LiNbO3 WAVEGUIDES, to Ionov, et al.

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Referring to Fig. 2 a broad overview of a communication system is shown having a reflector formed according to the present invention. Shown is a first satellite 12, a second satellite 14, a gateway station 16, a first optical communication system 18, a second optical communication system 20, and a data source 22.

The optical communication system is illustrated with respect to the first satellite 12, the second satellite 14 and the gateway station 16 that is, for example, positioned on the earth. The present invention is not limited to space-based communication systems as the present invention can be used for forming any surface or volume holograms. In some embodiments, the